



Collation of data on distribution of species and habitats in the Irish Sea. Stage 2

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**Collation of data on distribution of species and habitats in the Irish Sea. Stage 2****Introduction**

The report details the collation of data on the distribution of species and habitats in the Irish Sea. The work is part of the Irish Sea Pilot. The contract was awarded to the Marine Biological Association on the 24th February 2003. The first deliverables of the contract were due on the 14th March 2003 (see first report). The second deliverables were due on 15th May 2003. The agreed Second Stage deliverables were:

- A copy of Marine Recorder copy submitted to JNCC covering all features in Annex C of the tender specification.
- List of data sources covered
- List of searches made and comments on success.

Stage 2 of the contract asks for the collation of reports on the distribution of detailed species and habitats.

Species covered in Stage 2:

Common Name	Latin Name
Sea fan anemone	<i>Amphianthus dohrnii</i>
Sunset cup coral/Sunset star coral	<i>Leptopsammia pruvoti</i>
Worm anemone	<i>Scolanthus callimorphus</i>
Red sea fingers	<i>Alcyonium glomeratum</i>
Cup coral	<i>Caryophyllia inornata</i>
Devonshire cup-coral	<i>Caryophyllia smithii</i>
Carpet coral/Weymouth carpet coral	<i>Hoplangia durotrix</i>
Yellow cluster anemone	<i>Parazoanthus axinellae</i>
Worm	<i>Ophelia bicornis</i>
Ross worm	<i>Sabellaria spinulosa</i>
Bristle worm	<i>Sternaspis scutata</i>
Crab	<i>Achaeus cranchii</i>
Amphipod	<i>Pectenogammarus planicrurus</i>
Spiny cockle	<i>Acanthocardia aculeata</i>
Sea Slug	<i>Aeolidiella sanguinea</i>
Fan mussel	<i>Atrina fragilis</i>
Sea slug	<i>Caloria elegans</i>
Sea slug	<i>Doris sticta</i>
Mud snail	<i>Hydrobia (Ventrosia) ventrosa</i>
Dog whelk	<i>Nucella lapillus</i>
Yellow skirt slug	<i>Okenia elegans</i>
Limpet	<i>Patella ulyssiponensis aspera</i>
Lagoon sea slug	<i>Tenellia adspersa (Tenella adspersa)</i>
Sea slug	<i>Trapania maculata</i>
Edible sea urchin, Common sea urchin	<i>Echinus esculentus</i>



Habitats covered in Stage 2:

Pectenogammarus planicrurus in midshore well-sorted gravel or coarse sand
Cirratulids and <i>Cerastoderma edule</i> in littoral mixed sediment
<i>Sabellaria alveolata</i> reefs on sand-abraded eulittoral rock
<i>Flustra foliacea</i> and <i>Haliclona oculata</i> with a rich faunal turf on tide-swept circalittoral mixed substrata
<i>Suberites</i> sp. with a mixed turf of crisiids and <i>Bugula</i> sp. on heavily silted, moderately wave exposed, shallow circalittoral rock
<i>Ampharete falcata</i> turf with <i>Parvicardeum ovaleum</i> cohesive muddy very fine sand near margins of deep stratified seas
<i>Styela gelatinosa</i> and other solitary ascidians on very sheltered deep circalittoral muddy sediment
<i>Modiolus modiolus</i> beds with <i>Chlamys varia</i> , sponges, hydroids and bryozoans on slightly tide-swept very sheltered circalittoral mixed substrata
<i>Modiolus modiolus</i> beds on circalittoral mixed sediment
<i>Limaria hians</i> beds in tide-swept sublittoral muddy mixed sediment

Methods

Information sources

In accordance with the tender specification the sources of information were as follows:

- 1) JNCC Marine Library
- 2) JNCC file information
- 3) National Marine Biological Library
- 4) Contact with Chris Lumb

In addition to above the following sources were also consulted:

- 5) Dr Jason Hall-Spencer (*Limaria hians*)
- 6) Dr David Donnan, SNH (*Funiculina quadrangularis*)
- 7) Bill Cook, North Western and North Wales Sea Fisheries Committee (*Palinurus elephas*)

Information researched

1. JNCC Marine library & JNCC file information

Searches were made in Peterborough on the 5th and 6th March. The MNCR literature database on AREV was accessed. Searches of the literature database were made on:

- surveys with locational positions but no associated data on the MNCR database
- search of all entries by species
- search of all entries by representative species of the habitats listed.



In addition a manual check of the JNCC reports and reprints was carried out which agreed with the results of the MNCR database search.

The majority of reports in the JNCC library have already been entered into the MNCR database. As a clean up exercise the remaining references could be added for all species.

2. File searches were made of a number of JNCC files prepared by Dr Bill Sanderson on species being proposed as rare or scarce designation.

The file search revealed a number of notes on individual species that appear not to have been entered into the MNCR database. Individual species records were entered as a survey.

3. National Marine Biological Library.

The National Marine Biological Library (NMBL) holds 4496 serial titles, 1061 current serials, 13000 books, 80000 reprints, 1200 conference proceedings, 147 expedition report series, archives and rare material.

Searches were made on sea area and on the species list and habitats as well as representative species of the habitat.

233 initial references were revealed and researched. Additional references cited in the literature were also followed up.

Relevant references were then copied and where possible the details entered into Marine Recorder including the full reference.

4. Contact with Chris Lumb.

Chris Lumb was contacted, during Stage 1 of the contract and suggested a number of additional sources. These are detailed below and have been followed up during Stage 2.

Species	Suggested additional source
<i>Funiculina quadrangularis</i>	SNH records from ROV surveys in Loch Fyne. To be contacted. We have found earlier reference to surveys in Loch Fyne which note the absence of <i>Funiculina</i> . – Dr David Donnan contacted.
<i>Sabellaria alveolata</i>	Report by the University of Hull for English Nature. Report to be accessed.
<i>Palinurus elephas</i>	Suggested the Sea Fisheries Committee may have records for the Welsh Coast. To be contacted. – contacted North Western and North Wales Sea Fisheries Committee.
<i>Modiolus modiolus</i>	PhD underway with PEML. Chris Lumb is trying to access the data without comprising the research work. – Kate Northern (consultant) trying to get data.



5. Contact with Dr Jason Hall-Spencer

Dr Hall-Spencer provided a list of locations where he has seen *Limaria hians* within the Firth of Clyde.

- a. Around Pladda off the Mull of Kintyre
- b. Otter Spit, about half way up Loch Fyne (lat/long in Hall-Spencer & Moore, 2000)
- c. Furnace in Loch Fyne amongst rocks at low tide to about 3m, aren't extensive reefs subtidally.
- d. Stravanan Bay, Bute – but very rare at site as sampled extensively over 7 years and only ever found one live animal.

Historical records for the Firth of Clyde but the sites looked at (e.g. Skelmorlie Bank and the Tan Buoy around the Isle of Cumbrae) have been scallop dredged and only have dead shells.

6. Contact with Dr David Donnan, Scottish Natural Heritage (SNH)

Dr Donnan was contacted regarding ROV surveys carried out in Loch Fyne, however no ROV survey work took place in Loch Fyne. Work was carried out in Loch Long and in the vicinity of Arran and Cumbrae but there were no records of *Funiculina quadrangularis*.

7. Contact with North Western and North Wales Sea Fisheries Committee (Bill Cook)

Locations where *Palinurus elepahs* has been found:

- a. Bardsey
- b. Aberdaron Bay and the Sound
- c. Porth Golmon (anecdotal evidence), however, fisheries officer has never seen one further east than Braich-y-Pwll.

The local fisheries officer has been asked to contact the MBA but there has been no response to date.

All successful searches were recorded in a database developed in Microsoft Access™ to hold the information and references collected. It was considered that it was best to produce an interim database to catalogue the searches made rather than progress directly to Marine Recorder, which has been used for the final search results.

As much information as possible was obtained and entered to the database from published sources including limited circulation reports.

Results

Introduction

The majority of research literature accessed refers to survey data rather than providing direct access to the raw data. In the time-scale allowed it is not possible to source the original data but it is recommended that an exercise be carried out to ascertain which data



sources are most important (and accessible) and to search those out. We are also aware of experts in the various fields and would recommend we contact them to add additional data points.

All relevant datasets have been entered into Marine Recorder. A few assumptions have been made:

- A number of surveys did not contain geographical co-ordinates but did supply detailed maps. Co-ordinates were estimated using charts and GIS. Reference is made to the estimated co-ordinates within the metadata in Marine Recorder.
- 'Survey run by', within Marine Recorder, if unspecified in the paper has been taken as the organization or University department associated with the author.
- 'Surveyor' where unspecified was taken as the author.

Where there was not sufficient information to accurately estimate a geographical position of a survey a metadata only entry was included in Marine Recorder.

The following pages detail the relevant references including comments on their content. References have been

- a) entered onto Marine Recorder
- b) entered onto Marine Recorder as metadata only
- c) used as a reference only.

Searching for information on the distribution of species within the Irish Sea provided a wide range of references, many which included survey data. However, searching for the specified habitats has had limited success.

**Datasets entered onto Marine Recorder**

TABLE 1a

Reference	Species	Habitat	Comments
Allen, J.A., 1962. <i>The fauna of the Clyde Sea area. Mollusca.</i> Millport: Scottish Marine Biological Association.	<i>Arctica islandica</i> <i>Modiolus modiolus</i> <i>Atrina fragilis</i> <i>Patella ulyssiponesis aspera</i>	none	On Marine Recorder SURVEY: <u>Fauna of the Clyde Sea Area.</u> Includes a map showing most of the localities mentioned in the text, some locations are not shown grid references not included. <i>Patella aspersa (ulyssiponesis)</i> pg 12 <i>Modiolus modiolus</i> pg 52 <i>Pinna (Atrina) fragilis</i> pg 53 <i>Lima (Limaria) hians</i> pg 55 <i>Cypina (Arctica) islandica</i> pg 58.
Anwar, N. A., Richardson, C. A. & Seed, R., 1990. Age determination, growth rate and population structure of the horse mussel <i>Modiolus modiolus</i> . <i>J. Mar. Biol. Assoc. UK</i> , 70 , 441-457.	<i>Modiolus modiolus</i>	none	On Marine Recorder SURVEY: <u>Growth lines in <i>Modiolus modiolus</i>.</u> Samples from eight places around UK including Isle of Man, Strangford Lough, Irish Sea and North Wales. Sample details include sampling method and site characteristics. Locations estimated from map.
Barnes, R.S.K., 1987. Report of the NCC on a survey of the coastal lagoons of North Wales (R. Clwyd-Aberystwyth), September 1987. University of Cambridge, Department of Zoology.	<i>Hydrobia (Ventrosia ventrosa)</i>	none	On Marine Recorder SURVEY: <u>Survey of coastal lagoons of N. Wales (River Clwyd-Aberystwyth).</u> One recording card from survey includes <i>Hydrobia ventrosa</i> , grid reference and description of site included.



Reference	Species	Habitat	Comments
Bell, M. C. & Fish, J. D., 1996. Fecundity and seasonal changes in reproductive output of females of the gravel beach amphipod, <i>Pectenogammarus planicrurus</i> . <i>J. Mar. Biol. Assoc. UK</i> , 76 , 37-55.	<i>Pectenogammarus planicrurus</i>	<i>Pectenogammarus planicrurus</i> in midshore well-sorted gravel or coarse sand	On Marine Recorder SURVEY: <u>Fecundity of seasonal changes in the reproductive output of female <i>Pectenogammarus planicrurus</i>.</u> Location: Aberystwyth, west Wales. SN582819 Reference to: Bell, 1992. The ecology of gravel beach amphipod <i>P. planicrurus</i> ; Morgan, 1968. Biology of <i>P. planicrurus</i> PhD University of Wales; Morgan, 1970. <i>JMBA</i> , 50 , 769-785, Reid, 1940. <i>Annals & Magazine of Nat. His. Series II</i> , 6 , 287-292. Reid, 1944. <i>Synopses of British Fauna</i> 3 1-33.
Bishop, G. M. & Earll, R., 1984. Studies on the populations of <i>Echinus esculentus</i> at the St Abbs and Skomer voluntary marine nature reserves. <i>Progr. Underw. Sci.</i> , 9 , 53-66.	<i>Echinus esculentus</i>	none	On Marine Recorder SURVEY: <u>Studies on the populations at Skomer voluntary marine reserve.</u> Distribution of <i>Echinus esculentus</i> around Skomer (and St Abbs) no map or latitude/longitude so have taken survey area to be imaginary box all around coast of Skomer. Surveys in 1979 & 1989.
Brown, R.A., Seed, R., 1977. <i>Modiolus modiolus</i> (L.) - an autecological study. In <i>Biology of benthic marine organisms</i> , (ed. B.F. Keegan <i>et al.</i>), Pergamon Press: Oxford.	<i>Modiolus modiolus</i>	none	On Marine Recorder SURVEY: <u><i>Modiolus modiolus</i> an autecological study.</u> <i>Modiolus modiolus</i> in Strangford Lough, monthly samples since December 1971, intertidal population in Belfast Lough sampled infrequently since may 1975. Full title of book: Biology of benthic marine organisms: 11th European Symposium on Marine Biology, Galway, 5-11 October 1976. (eds B. F. Keegan, P. O Ceidigh and P. J. S. Boaden). Pergamon Press: Oxford.
Burrows, E.M., 1958. Sublittoral algal population in Port Erin Bay, Isle of Man. <i>J. Mar. Biol. Assoc. UK</i> , 37 , 687-703.	none	<i>Laminaria saccharina</i> , <i>Chorda filum</i> and dense red seaweeds on shallow unstable infralittoral boulders or cobbles	On Marine Recorder SURVEY: <u>Sublittoral algal populations in Port Erin Bay, Isle of Man.</u> Species list in paper, <i>Laminaria saccharina</i> , <i>Chorda filum</i> and all red seaweeds have been included in MR. No latitude/longitude is given in the paper. Abundance measure used is percentage occurrence in sample
Comely, C.A., 1978. <i>Modiolus modiolus</i> (L.) from the Scottish west coast. I. Biology. <i>Ophelia</i> , 17 , 167-193.	<i>Modiolus modiolus</i>	none	On Marine Recorder SURVEY: <u><i>Modiolus modiolus</i> from the Scottish west coast.</u> Map of locations but no grid references included. Location: Ardyne, Achavoulin Bay, north-west Scotland.



Reference	Species	Habitat	Comments
Crothers, J. H., 1974. On variation in the shell of the Dogwhelk (<i>Nucella lapillus</i> (L.)). I. Pembrokeshire. <i>Field studies</i> , 4 , 39-60.	<i>Nucella lapillus</i>	none	On Marine Recorder SURVEY: <u>Variation in the shell of the dog-whelk <i>Nucella lapillus</i>: Pembrokeshire.</u> <i>Nucella lapillus</i> collected alive from Pembrokeshire and shell measured. Sites with grid references and date collected included.
Cunningham, P.N., <i>et al.</i> , 1984. The geographical distribution of <i>Sabellaria alveolata</i> (L) in England, Wales and Scotland...University of Manchester, pp. ii,39.	<i>Sabellaria alveolata</i>	none	On Marine Recorder SURVEY: <u>Geographical distribution of <i>Sabellaria alveolata</i> in England, Scotland and Wales.</u> Maps and grid references included with abundance (SACFORN) scale. Historical distribution also discussed.
Davies, M., 1989. Marine Nature Conservation Review surveys of Scottish sea lochs - Loch Fyne. Volume 1 Report. NCC report.	<i>Serpula vermicularis</i> <i>Modiolus modiolus</i> <i>Nucella lapillus</i> <i>Echinus esculentus</i>	none	On Marine Recorder SURVEY: <u>Survey of Scottish Sealochs: Loch Fyne.</u> Survey carried out in Loch Fyne in 1988. Descriptions of sites and grid references included in report.
Duhig, M., 1960. The Amphipoda of Dalkey Island and its neighbouring waters. <i>Proc. R. Ir. Acad. (B)</i> , 61 , 59-77.	<i>Pectenogammarus planicrurus</i>	<i>Pectenogammarus planicrurus</i> in midshore well-sorted gravel or coarse sand	On Marine Recorder SURVEY: <u>Amphipoda of Dalkney Island and its neighbouring waters.</u> Records of <i>Pectenogammarus planicrurus</i> from Ireland.
Erwin, D.G., 1977. <i>A diving survey of Strangford Lough: the benthic communities and their relation to substrate - a preliminary account. In Biology of Benthic Organisms (Ed. b.F. Keegan et al.), pp.215-224. Oxford: Pergamon Press</i>	<i>Modiolus modiolus</i>	<i>Modiolus modiolus</i> beds with <i>Chlamys varia</i> , sponges, hydroids and bryozoans on slightly tide-swept very sheltered circalittoral mixed substrata	On Marine Recorder SURVEY: <u>Diving survey of Strangford Lough: The benthic communities and their relation to substrate.</u> Map of locations given in paper but not latitude/longitude or grid references provided. Mud and Shell Community with <i>Modiolus modiolus</i> . SCR.ModCvar?



Reference	Species	Habitat	Comments
Erwin, D.G., Picton, B.E., Brachi, R., Elliot, R.C.A., 1983. A diving survey of the substrates and benthic fauna of Dundrum Bay, Northern Ireland. <i>Prog. Underw. Sci.</i> , 8 , 21-48.	<i>Caryophyllia smithii</i> <i>Echinus esculentus</i> <i>Palinurus elephas</i> <i>Arctica islandica</i>	none	On Marine Recorder SURVEY: <u>Diving survey of the substrates and benthic fauna of Dundrum Bay, Northern Ireland.</u> Survey between 54° 10'N and 54° 17' N and longitudes of 5° 41'N and 5° 55'W. Six major "faunal associations" were found - locations are shown on map but no actual latitude longitude is provided. Species found have been allocated to associations.
Grave, S. & Whitaker, A., 1997. The occurrence of a subtidal <i>Sabellaria alveolata</i> (L.) reef off Wicklow Head, Irish Sea, <i>Ir. Nat. J.</i> , 25 (11/12) , 416-418.	<i>Sabellaria alveolata</i>	<i>Sabellaria alveolata</i> reefs on sand-abraded eulittoral rock	On Marine Recorder SURVEY: <u>Occurrence of a subtidal <i>Sabellaria alveolata</i> reef off Wicklow Head, Irish Sea.</u> Locational information included in paper. References: Kirtely & Tanner, 1968. <i>J. Sediment. Petrol</i> , 38 (1) , 73-78 Williams, 1954. Fauna of Strangford Lough. <i>Proc. Royal Irish Acad.</i> , 56B , 29-133.
Hall-Spencer, J.M., & Moore, P.G., 2000. <i>Limaria hians</i> (Mollusca: Limacea): A neglected reef-forming keystone species. <i>Aquatic Conservation</i> , 10 , 267-278.	<i>Modiolus modiolus</i> <i>Echinus esculentus</i>	<i>Limaria hians</i> beds in tide-swept sublittoral muddy mixed sediment	On Marine Recorder SURVEY: <u><i>Limaria hians</i> in Loch Fyne.</u> 5 year study, regular dive surveys in Greag Gobhainn area of Loch Fyne. 56° 00.601' N 005° 22.148'W <i>Limaria hians</i> beds. <i>Modiolus modiolus</i> found attached to nests of <i>Limaria hians</i> ; <i>Echinus esculentus</i> mainly mobile on nests of <i>Limaria hians</i> .
Hiscock, S., Sublittoral survey of the mid-Wales sarns (reefs): Sarn Badrig, Sarn-y-Bwch and Cynfelin Patches, July 2nd to 8th 1986. Vol.I, survey report. Peterborough: NCC	none	<i>Laminaria saccharina</i> , <i>Chorda filum</i> and dense red seaweeds on shallow unstable infralittoral boulders or cobbles	On Marine Recorder SURVEY: <u>Survey of the sublittoral algal communities of the Sarn Badrig reef, Mid Wales.</u> Grid references included. Information on habitat features, substrate and sediment features are included in the report - in different format to MNCR therefore to Marine Recorder so not included.
Hughes, T.G., & Moore, J.J., 1985. Distribution of some sublittoral species in north west Wales. <i>Prog. Underw. Sci.</i> , 10 , 83-95.	<i>Palinurus elephas</i> <i>Caryophyllia smithii</i> <i>Echinus esculentus</i>	none	On Marine Recorder SURVEY: <u>Distribution of some sublittoral species in north west Wales.</u> Collated records from six years of diving around north west Wales. 11 sites listed, map of locations but no grid reference included, so estimated from map. Long list of species seen but only three relevant.
Hunter, E., <i>et al.</i> , 1996. Recent studies on the crawfish <i>Palinurus elephas</i> in South Wales and Cornwall. <i>J. Mar. Biol. Assoc. UK</i> , 76 , 963-983.	<i>Palinurus elephas</i>	none	On Marine Recorder SURVEY: <u>Studies on the Crawfish <i>Palinurus elephas</i> in south wales (and cornwall).</u> Most <i>Palinurus elephas</i> taken from Cornish waters but some from within the survey area around south Wales. Map of area but no lat/long included so estimated from map.



Reference	Species	Habitat	Comments
Jasim, A. K. & Brand, A. R., 1989. Observations on the reproduction of <i>Modiolus modiolus</i> in Isle of Man waters, <i>J. Mar. Biol. Assoc. UK</i> , 69 , 373-385.	<i>Modiolus modiolus</i>	none	On Marine Recorder SURVEY: <u>Observations on the reproduction of <i>Modiolus modiolus</i> in Isle of Man waters.</u> Distribution of <i>M. modiolus</i> around IOM described by Jones (1951) - assumed similar distribution although no attempts to resurvey. Small map of assumed locations: SE IOM (no grid reference or latitude/longitude included in paper so estimated). References to: Tebble, 1966. <i>British Bivalve Seashells</i> , London: British Museum (Natural History). Jones, 1951 <i>J. Animal Ecol.</i> 20 , 132-144. Comeley, 1978. <i>Ophelia</i> , 17 , 167-193.
Jones, N. S., 1951. The bottom fauna off the Isle of Man, <i>J. Animal Ecol.</i> , 20 , 132-144.	<i>Serpula vermicularis</i> <i>Modiolus modiolus</i> <i>Echinus esculentus</i>	none	On Marine Recorder SURVEY: <u>Bottom fauna of the south Isle of Man.</u> Area surveyed to update IOM marine fauna. Bottom type, locations (shown on map) and abundance - samples are given as percentage occurrence of species for all hauls in which animals were identified. If species occurred in 100% of the hauls then it has been entered into Marine Recorder (only <i>Modiolus modiolus</i>). <i>Serpula vermicularis</i> and <i>Echinus esculentus</i> were also found in the some of the trawls but have not been entered as they did not occur in all of them. References: Jones, 1940. <i>Proceedings of the Liverpool Biological Society</i> , 53 , 1-34.; Holme, 1950. <i>JMBA</i> , 29 , 163-83; Moore, 1937. <i>Proceedings of the Liverpool Biological Society</i> , 50 , 1-293.
Jones, N. S., 1952. The bottom fauna and the food of flatfish off the Cumberland coast, <i>J. Animal Ecol.</i> , 21 , 182-205.	<i>Echinus esculentus</i>	none	On Marine Recorder SURVEY: <u>bottom fauna and the food of flatfish off the Cumbrian coast.</u> <i>Echinus esculentus</i> dredged from Cumbrian coast, map of sampling locations but no grid references or latitude/longitude included.
Jones, N. S., 1956. The fauna and biomass of a muddy sand deposit of Port Erin, Isle of Man, <i>J. Animal Ecol.</i> , 25 , 217-252.	<i>Echinus esculentus</i>	none	On Marine Recorder SURVEY: <u>Fauna of a muddy sand deposit off Port Erin, Isle of Man.</u> <i>Echinus esculentus</i> , no grid references but map and depths included.
Jones, N.S., 1948. The ecology of the Amphipoda of the south Isle of Man. <i>J. Mar. Biol. Assoc. UK</i> , 27 , 400-439.	<i>Pectenogammarus planicrurus</i>	none	On Marine Recorder SURVEY: <u>Amphipoda of the south Isle of Man.</u> 1st record of <i>Pectenogammarus planicrurus</i> from the Isle of Man. A map of locations is included in the paper, but no grid references are given.



Reference	Species	Habitat	Comments
Kennedy, R.J., & Roberts, D., 1999. Current status of the flat oyster <i>Ostrea edulis</i> in Strangford Lough, Northern Ireland, with a view to the restoration of its oyster beds. <i>Biology and Environment</i> , 99B (2), 79-87.	<i>Ostrea edulis</i>	none	On Marine Recorder SURVEY: <u>Survey of the current status of <i>Ostrea edulis</i> in Strangford Lough, Northern Ireland.</u> Survey in Strangford Lough (NI) into the status of oyster (<i>Ostrea edulis</i>) beds. 27 sites sampled both sublittoral sites and intertidal. Absence of species recorded as well as presence. Map of Strangford Lough with abundance scale (no per m ²) but no lat/long.
Killeen, I., 1995. 1993 autumn meeting to the Isle of Man - Mollusca recorded in the dredging trip. <i>Porcupine Newsletter</i> , 5 , 252-255.	<i>Modiolus modiolus</i>	none	On Marine Recorder SURVEY: <u>Mollusca recorded on a dredging trip - Isle of Man.</u> Coordinates, details of gear used, depth and substrate are included in the paper, abundances of species were recorded but are not included in paper.
Lumb, C.M., 1983. <i>Menai Strait sublittoral survey 10th April to 19th September 1982</i> . A report to the NCC, iv, 70p. NCC/University College of North Wales Marine Science Laboratories.	<i>Nucella lapillus</i>	none	On Marine Recorder SURVEY: <u>Menai Strait sublittoral survey.</u> Grid references and descriptions of habitats are included in report.
Madden, B., Jennings, E., Jeffrey, D.W., 1993. Distribution and Ecology of <i>Zostera</i> in County Dublin. <i>Ir. Nat. J.</i> , 24 , 303-310.	none	<i>Zostera noltii</i> beds in littoral muddy sands	On Marine Recorder SURVEY: <u>Distribution and ecology of <i>Zostera</i> in County Dublin.</u> <i>Zostera marina</i> , <i>Z. noltii</i> and <i>Z. angustifolia</i> beds from Dublin Bay, survey carried out in 1990. Grid references included for all survey areas except one.
Magorrian, B. H. & Service, M., 1998. Analysis of underwater visual data to identify the impact of physical disturbance on horse mussel (<i>Modiolus modiolus</i>) beds. <i>Mar. Pollut. Bull.</i> , 36 , 354-359.	<i>Modiolus modiolus</i>	none	On Marine Recorder SURVEY: <u>Analysis of underwater visual data to identify the impact of physical disturbance on horse mussel.</u> <i>Modiolus modiolus</i> in Strangford Lough, Northern Ireland. Exact location data appears absent so co-ordinates from centre of Lough have been used. No date mentioned in the text with regard to the undertaking of this survey.



Reference	Species	Habitat	Comments
Morgan, E., 1970. The effect of environmental factors on the distribution of the amphipod <i>Pectenogammarus planicrurus</i> , with particular reference to grain size. <i>J. Mar. Biol. Assoc. UK</i> , 50 , 769-785.	<i>Pectenogammarus planicrurus</i>	<i>Pectenogammarus planicrurus</i> in midshore well-sorted gravel or coarse sand	<p align="center">On Marine Recorder</p> <p>SURVEY: <u>Effect of environmental factors on the distribution of the amphipod <i>Pectenogammarus planicrurus</i>.</u> No latitude/longitude included but map of location in paper. Distribution: shingle beaches at Port Erin (Jones 1948), Aberystwyth - Cardigan Bay (Watkin Unpublished). Jones 1948, The ecology of the Amphipoda of the S IOM. <i>JMBA</i>, 27, 400-39.</p>
Nichols, D., 1984. An investigation of the population dynamics of the common edible sea urchin (<i>Echinus esculentus</i> L.) in relation to species conservation management. Report to the Dept. of Env. and NCC.	<i>Echinus esculentus</i>	none	<p align="center">On Marine Recorder</p> <p>SURVEY: <u>Effect of depth and exposure on gonad production in <i>Echinus esculentus</i>.</u> <i>Echinus esculentus</i> collected from the Firth of Clyde in the region of Keppel Pier, Millport, Isle of Cumbrae (no actual grid references are given in report so estimated).</p>
Nichols, D., Bishop, G.M., Sime, A.A.T., 1983. The effect of depth and exposure on gonad production in the sea urchin, <i>Echinus esculentus</i> (Echinodermata: Echinoidea) from sites around the British Isles. <i>Progr. Underw. Sci.</i> , 8 , 61-71.	<i>Echinus esculentus</i>	none	<p align="center">On Marine Recorder</p> <p>SURVEY: <u>Growth in populations of <i>Echinus esculentus</i> from the Firth of Clyde.</u> Populations from near Plymouth, Great Cumbrae (Firth of Clyde) southern and eastern sides collected from the Firth of Clyde in the region of Keppel Pier, Millport, Isle of Cumbrae (no actual grid references are given in report so have been estimated Collections made by SCUBA divers between 1981-83 Reference: Nichols, 1982. A biometric study of populations of <i>E. esculentus</i>. Report to the Department of the Environment UK. Part 1 20pp.</p>
Nichols, D., Sime, A. A. T. & Bishop, G. M., 1985. Growth in populations of the sea-urchin <i>Echinus esculentus</i> L. (Echinodermata: Echinoidea) from the English Channel and Firth of Clyde, <i>J. Expt Mar. Biol. Ecol.</i> , 86 , 219-228.	<i>Echinus esculentus</i>	none	<p align="center">On Marine Recorder</p> <p>SURVEY: <u>Growth in populations of <i>Echinus esculentus</i> from the Firth of Clyde.</u> Populations from near Plymouth, Great Cumbrae (Firth of Clyde) southern and eastern sides collected from the Firth of Clyde in the region of Keppel Pier, Millport, Isle of Cumbrae (no actual grid references are given in report so have been estimated Collections made by SCUBA divers between 1981-83 Reference: Nichols, 1982. A biometric study of populations of <i>E. esculentus</i>. Report to the Department of the Environment UK. Part 1 20pp.</p>



Reference	Species	Habitat	Comments
Oliver, P.G., <i>et al.</i> , 1986. Report on the molluscan and polychaeta faunas of selected sites within the Menai bridge conservation area. Report to the NCC.	<i>Arctica islandica</i> <i>Modiolus modiolus</i> <i>Nucella lapillus</i> <i>Patella ulyssiponesis aspera</i>	none	On Marine Recorder SURVEY: <u>Molluscan and polychaeta faunas of selected sites within the Menai marine conservation area.</u> Species list with abundance of molluscs and polychaetes. A map of sampling locations is given but no latitude longitude. Species abundance is not included (Oliver, P.G., Mackie, A.S.Y., & Trew, A.).
Roberts, C. D., 1975. Investigations into a <i>Modiolus modiolus</i> (L.), (Mollusca: Bivalvia) community in Strangford Lough, N. Ireland, <i>Underw. Assoc. Rep.</i> , 1 , 27-49.	<i>Echinus esculentus</i> <i>Modiolus modiolus</i> <i>Serpula vermicularis</i>	none	On Marine Recorder SURVEY: <u>Investigations into a <i>Modiolus modiolus</i> community in Strangford Lough, Northern Ireland.</u> Map but no grid refs for locations in Strangford Lough where <i>M. modiolus</i> found. <i>Chlamys varia</i> also included SCR.ModCvar?
Rostron, D. M., 1988. Skomer Marine Reserve Subtidal Monitoring Project Animal Communities on Stones March 1987 to January 1988. A report to the NCC.	<i>Caryophyllia smithii</i> <i>Sabellaria spinulosa</i>	none	On Marine Recorder SURVEY: <u>Skomer Marine Reserve subtidal monitoring project animal communities on stones.</u> Map of location but no actual latitude/longitude included in report so has been estimated.
Sanderson, W.G., JNCC candidate rare species files.	<i>Palinurus elephas</i> <i>Alcyonium glomeratum</i> <i>Caryophyllia inornata</i> <i>Parazoanthus axinellae</i> <i>Tenellia adspersa</i> (<i>Tenella adspersa</i>) <i>Hoplangia durotrix</i> <i>Aeolidiella sanguinea</i> <i>Caloria elegans</i> <i>Okenia elegans</i>	none	On Marine Recorder SURVEY: <u>JNCC candidate rare species files, <i>species name</i> records.</u> Records of: <i>Palinurus elephas</i> <i>Alcyonium glomeratum</i> <i>Caryophyllis inornata</i> <i>Parazoanthus axinellae</i> <i>Aeolodiella sanguinea</i> <i>Hoplangia durotrix</i> <i>Okenia elegans</i> <i>Caloria elegans</i> from Skomer Island and other locations in Pembrokeshire. <i>Tenellia adspersa</i> not found within ISP area.



Reference	Species	Habitat	Comments
<p>Seaward, D.R., 1982. <i>Sea area atlas of the marine molluscs of Britain and Ireland</i>. Peterborough: Nature Conservancy Council.</p>	<p><i>Arctica islandica</i> <i>Modiolus modiolus</i> <i>Ostrea edulis</i> <i>Aeolidiella sanguinea</i> <i>Atrina fragilis</i> <i>Caloria elegans</i> <i>Doris sticta</i> <i>Hydrobia (Ventrosia ventrosa)</i> <i>Nucella lapillus</i> <i>Okenia elegans</i> <i>Patella ulyssiponesis aspera</i> <i>Tenellia adspersa (Tenella adspersa)</i> <i>Trapania macultata</i></p>	<p>none</p>	<p style="text-align: center;">On Marine Recorder</p> <p>SURVEY: <u>Sea area atlas of the marine molluscs of Britain & Ireland</u> Sea areas included in ISP area:</p> <p>S21 - Bristol Channel (part of) ; S22 - Cardigan Bay; S23 - Anglesey; S24 - Liverpool Bay; S25 - Solway; S26 - Isle of Man; S27 - Dublin; S28 - Belfast; S29 - Clyde and Argyll (part of); S29a - Antrim (part of); S39 - Nympe Bay.</p> <p>Species included: <i>Arctica islandica</i> - map 593. <i>Atrina fragilis</i> map 532. <i>Modiolus modiolus</i> map 518. <i>Aeolidiella sanguinea</i> map 459. <i>Acanthocardia aculeata</i> map 597 not within ISP area. <i>Caloria elegans</i> map 452. <i>Doris sticta</i> synonym <i>Doris maculata</i> map 431. <i>Ventrosia ventrosa</i> map 82. <i>Nucella lapillus</i> map 208. <i>Okenia elegans</i> map 399. <i>Patella ulyssiponesis adspersa</i> synonym <i>Patella adspersa</i> map 32. <i>Trapania maculata</i> map 405. <i>Tenellia adspersa</i> map 479. <i>Ostrea edulis</i> map 534.</p>



Reference	Species	Habitat	Comments
<p>Seaward, D.R., 1990. <i>Distribution of marine molluscs of north west Europe.</i> Peterborough: Nature Conservancy Council.</p>	<p><i>Arctica islandica</i> <i>Modiolus modiolus</i> <i>Ostrea edulis</i> <i>Aeolidiella sanguinea</i> <i>Atrina fragilis</i> <i>Caloria elegans</i> <i>Doris sticta</i> <i>Hydrobia (Ventricosia ventrosa)</i> <i>Nucella lapillus</i> <i>Okenia elegans</i> <i>Patella ulyssiponesis aspera</i> <i>Tenellia adspersa (Tenella adspersa)</i> <i>Trapania maculata</i></p>	<p>none</p>	<p style="text-align: right;">On Marine Recorder</p> <p>SURVEY: <u>Sea area atlas of the marine molluscs of Britain & Ireland.</u> Sea areas included in ISP area: S21 - Bristol Channel (part of) ; S22 - Cardigan Bay; S23 - Anglesey; S24 - Liverpool Bay; S25 - Solway; S26 - Isle of Man; S27 - Dublin; S28 - Belfast; S29 - Clyde and Argyll (part of); S29a - Antrim (part of); S39 - Nympe Bay.</p> <p>Species included: <i>Arctica islandica</i> - map 593. <i>Atrina fragilis</i> map 532. <i>Modiolus modiolus</i> map 518. <i>Aeolidiella sanguinea</i> map 459. <i>Acanthocardia aculeata</i> map 597 not within ISP area. <i>Caloria elegans</i> map 452. <i>Doris sticta</i> synonym <i>Doris maculata</i> map 431. <i>Ventricosia ventrosa</i> map 82. <i>Nucella lapillus</i> map 208. <i>Okenia elegans</i> map 399. <i>Patella ulyssiponesis adspersa</i> synonym <i>Patella adspersa</i> map 32. <i>Trapania maculata</i> map 405. <i>Tenellia adspersa</i> map 479. <i>Ostrea edulis</i> map 534.</p>



Reference	Species	Habitat	Comments
<p>Seaward, D.R., 1993. Additions and amendments to the <i>Distribution of the marine molluscs of north west Europe</i> 1990. Joint Nature Conservation Committee Report, No. 165.</p>	<p><i>Arctica islandica</i> <i>Modiolus modiolus</i> <i>Ostrea edulis</i> <i>Aeolidiella sanguinea</i> <i>Atrina fragilis</i> <i>Caloria elegans</i> <i>Doris sticta</i> <i>Hydrobia (Ventrosia ventrosa)</i> <i>Nucella lapillus</i> <i>Okenia elegans</i> <i>Patella ulyssiponesis aspera</i> <i>Tenellia adspersa (Tenella adspersa)</i> <i>Trapania maculata</i></p>	<p>none</p>	<p style="text-align: center;">On Marine Recorder</p> <p>SURVEY: <u>Sea area atlas of the marine molluscs of Britain & Ireland.</u> Sea areas included in ISP area: S21 - Bristol Channel (part of) ; S22 - Cardigan Bay; S23 - Anglesey; S24 - Liverpool Bay; S25 - Solway; S26 - Isle of Man; S27 - Dublin; S28 - Belfast; S29 - Clyde and Argyll (part of); S29a - Antrim (part of); S39 - Nymphe Bay.</p> <p>Species included: <i>Arctica islandica</i> - map 593. <i>Atrina fragilis</i> map 532. <i>Modiolus modiolus</i> map 518. <i>Aeolidiella sanguinea</i> map 459. <i>Acanthocardia aculeata</i> map 597 not within ISP area. <i>Caloria elegans</i> map 452. <i>Doris sticta</i> synonym <i>Doris maculata</i> map 431. <i>Ventrosia ventrosa</i> map 82. <i>Nucella lapillus</i> map 208. <i>Okenia elegans</i> map 399. <i>Patella ulyssiponesis adspersa</i> synonym <i>Patella adspersa</i> map 32. <i>Trapania maculata</i> map 405. <i>Tenellia adspersa</i> map 479. <i>Ostrea edulis</i> map 534.</p>



Reference	Species	Habitat	Comments
Smith, S. M., 1984. Marine mollusca of Arran and adjacent seas. Report to the NCC [Contract Number HF3/11/06].	<i>Nucella lapillus</i> <i>Arctica islandica</i> <i>Modiolus modiolus</i> <i>Atrina fragilis</i> <i>Nucella lapillus</i> <i>Patekka ulyssiponesis aspera</i>	none	On Marine Recorder SURVEY: <u>Marine mollusca of Arran and adjacent seas.</u> Species list for molluscs from Arran. Maps of locations given with sampling stations marked, lat/long given.
Spence, S. K., & Hawkins, S. J., 1989. A review of the survey of Dogwhelk (<i>Nucella lapillus</i>) populations to assess the extent of Tributyltin (TBT) contamination around the UK, 1986-89. Port Erin Marine Laboratory.	<i>Nucella lapillus</i>	none	On Marine Recorder SURVEY: <u>review of the survey of <i>Nucella lapillus</i> populations to assess the extent of TBT contamination.</u> Nationwide survey to assess damage of TBT on populations of <i>Nucella lapillus</i> . Map and grid references for populations examined.
Spence, S. K., <i>et al.</i> , 1990. Third and final report of MCS/Institute of Biology survey of dogwhelk (<i>Nucella lapillus</i>) population around the UK.	<i>Nucella lapillus</i>	none	On Marine Recorder SURVEY: <u>review of the survey of <i>Nucella lapillus</i> populations to assess the extent of TBT contamination.</u> Looking at the <i>Nucella lapillus</i> and TBT. Map of locations and grid references for populations surveyed.
Veale, L.O., Hill, A.S., Hawkins, S.J., Brand, A.R., 2001. Distribution and damage to the by-catch assemblages of the northern Irish Sea scallop dredge fisheries. <i>J. Mar. Biol. Assoc. UK</i> , 81 , 85-96.	<i>Echinus esculentus</i>	none	On Marine Recorder SURVEY: <u>Distribution and damage to by-catch assemblages of the northern Irish Sea scallop dredge fisheries.</u> Investigates the distribution and abundance of major by-catch species caught during surveys from 1992 to 1996, and assess the damage sustained by these species during surveys in 1994 and 1995. Map of locations included but no grid references or latitude/longitudes included.
Williams, G., 1954. Fauna of Strangford Lough and neighbouring coasts. <i>Proc. R.I.A.</i> , 3 , 29-133.	<i>Sabellaria alveolata</i> <i>Serpula vermicularis</i> <i>Ostrea edulis</i> <i>Caryophyllia smithii</i> <i>Nucella lapillus</i> <i>Echinus esculentus</i> <i>Modiolus modiolus</i>	none	On Marine Recorder SURVEY: <u>Fauna of Strangford Lough and neighbouring coasts.</u> Historical information and surveying by the author collated distributional information about the fauna of Strangford Lough and the surrounding area. Maps showing the locations of the sampling sites are included in the paper, however no grid references or latitude/longitude was included so this has been estimated from a map. Not all the sites appear on map.



Reference	Species	Habitat	Comments
Wilson, D. P., 1977. <i>Modiolus modiolus</i> (L.) in small mid-tidal rock pools at Penrhyn Bay, North Wales, <i>Est. Coast. Mar. Sci.</i> , 5 , 215-222.	<i>Modiolus modiolus</i> <i>Sabellaria alveolata</i> <i>Nucella lapillus</i>	none	On Marine Recorder SURVEY: <i>Modiolus modiolus</i> in small Mid-tidal rock pools at Penrhyn Bay, North Wales. Rock pools inhabited by <i>M. modiolus</i> since 1920s at Penrhyn Bay, Rhos-on-Sea - location provided in paper. Also has records of <i>Sabellaria alveolata</i> and <i>Nucella lapillus</i> .



Datasets entered onto Marine Recorder as metadata only

TABLE 1b

Reference	Species	Habitat	Comments
Bruce, J.R., Colman, J.S. & Jones, N.S., 1963. <i>Marine fauna of the Isle of Man</i> . Liverpool: Liverpool University Press.	<i>Caryophyllia smithii</i> <i>Sabellaria spinulosa</i> <i>Pectenogammarus planicrurus</i> <i>Nucella lapillus</i> <i>Patella ulyssiponesis aspera</i> <i>Echinus esculentus</i> <i>Serpula vermicularis</i> <i>Palinurus elephas</i> <i>Modiolus modiolus</i> <i>Ostrea edulis</i> <i>Achaeus cranchii</i>	none	On Marine Recorder as metadata only - no latitude/longitude or grid references included, difficult to estimate exact locations from maps. SURVEY: <u>Marine fauna of the Isle of Man and its surrounding seas (metadata only).</u> <i>Serpula vermicularis</i> pg 107, <i>Sabellaria spinulosa</i> pg 104, <i>Palinurus elephas</i> pg 169, <i>Achaeus cranchii</i> pg 178 <i>Modiolus modiolus</i> pg 211, <i>Ostrea edulis</i> pg 212, <i>Caryophyllia smithii</i> pg 65, <i>Pectenogammarus planicrurus</i> pg 158, <i>Nucella lapillus</i> pg 195, <i>Patella ulyssiponesis aspera</i> pg 188, <i>Echinus esculentus</i> pg 242.
Duhig, M. & Humphries, C., 1955. <i>Amphilocheus brunneus</i> Della Valle, an amphipod new to Britain and Ireland and notes on other amphipods not recorded in Irish coastal waters, <i>Proc. R. Ir. Acad. (B)</i> , 57 , 123-129.	<i>Pectenogammarus planicrurus</i>	<i>Pectenogammarus planicrurus</i> in midshore well-sorted gravel or coarse sand	On Marine Recorder - metadata only SURVEY: <u>Amphipods new to Britain and Ireland (metadata only).</u> <i>Pectenogammarus planicrurus</i> from Irish waters. Collected from Shanganah Strand (20/12/1951) found under boulders in sand situated at edge of limestone boulder clay area. White Rock, Killiney (4/4/1952) collected at waters edge.
Holt, T., 2000. Isle of Man intertidal survey. <i>Irish Sea Forum</i> , 30-34.	none	none	On Marine Recorder as metadata only SURVEY: <u>Isle of Man intertidal survey (metadata only).</u> Isle of Man coast line was mapped between 1995 to 1999, mainly in spring and summer months. Descriptive information is provided about habitats found during the survey. No species list is provided, notes absence of <i>Sabellaria</i> reefs and intertidal eel grass.



Reference	Species	Habitat	Comments
Moore, H. B., 1937. Marine fauna of the Isle of Man. <i>Proceedings and Transactions of the Liverpool Biological Society</i> , L , 117-28.	<i>Serpula vermicularis</i> <i>Palinurus elephas</i> <i>Arctica islandica</i> <i>Modiolus modiolus</i> <i>Ostrea edulis</i> <i>Caryophyllia smithii</i> <i>Sabellaria spinulosa</i> <i>Nucella lapillus</i> <i>Echinus esculentus</i>	none	<p>On Marine Recorder - as metadata only - no latitude/longitude or grid references included, very basic maps so difficult to estimate locations.</p> <p>SURVEY: <u>Marine Fauna of the Isle of Man (metadata only).</u></p> <i>Serpula vermicularis</i> pg. 83 <i>Palinurus elephas</i> pg.132 <i>Caryophyllia smithii</i> pg. 56 <i>Sabellaria spinulosa</i> pg. 81 <i>Modiolus modiolus</i> pg. 153 <i>Ostrea edulis</i> pg. 153 <i>Arctica islandica</i> (as <i>Cyprina islandica</i>) pg. 158 <i>Nucella lapillus</i> pg.183 <i>Echinus esculentus</i>
Woodward, F.R., 1985. The fan mussel, <i>Pina fragilis</i> Pennant, in Scotland. <i>Glasgow Naturalist</i> , 21(1) , 63-69.	<i>Atrina fragilis</i>	none	<p>On Marine Recorder - metadata only</p> <p>SURVEY: <u>fan mussel <i>Pinna (Atrina) fragilis</i> in Scotland (metadata only).</u></p> Synonym for <i>Atrina fragilis</i> . Lists sites where fan mussel found but no grid references included. As the record gives no more locational information than a place name and the record is not confirmed, metadata entry only.



Reference only papers.

TABLE 1c

Reference	Species	Habitat	Comments
Ansell, A. D. & Robb, L., 1977. The spiny lobster <i>Palinurus elephas</i> in Scottish waters. <i>Mar. Biol.</i> , 43 , 63-70.	<i>Palinurus elephas</i>	none	Reference only - outside of Irish Sea Pilot (ISP) area. <i>Palinurus elephas</i> rare in Scottish waters so most records kept.
Bell, M. C., 1995. <i>Pectenogammarus planicrurus</i> - there is life in gravel beaches. <i>Porcupine Newsletter</i> , 6 , 41-47.	<i>Pectenogammarus planicrurus</i>	<i>Pectenogammarus planicrurus</i> in midshore well-sorted gravel or coarse sand	Reference only - no survey data included. Review of known distribution of <i>Pectenogammarus planicrurus</i> . Refs: Duhig & Humphries, 1955. <i>Proc. R. Ir. Acad. (B)</i> , 57 , 123-129. Duhig, 1960. <i>Proc. R. Ir. Acad. (B)</i> , 61 , 59-77 (County Dublin) Jones, 1948. The ecology of the Amphipoda of the south Isle of Man. <i>J. Mar. Biol. Assoc. UK</i> , 27 , 400-439. (IOM)
Bishop, G. M., 1989. Studies on the European sea urchin <i>Echinus esculentus</i> using volunteers, 1977-1986. <i>Progr. Underw Sci.</i> , 13 , 15-39.	<i>Echinus esculentus</i>	none	Reference only No latitude/longitude available, very small map of distribution around UK.
Bosence, D. W. J., 1979. The factors leading to aggregation and reef formation in <i>Serpula vermicularis</i> L. In: Biology and Systematics of Colonial Organisms. Larwood and Rosen, 299-318.	<i>Serpula vermicularis</i>	none	Reference only - outside of ISP area. <i>Serpula vermicularis</i> from Ardbear Lough, County Galway. References: McIntosh, 1923. A monograph of 3 marine annelids, Ray society 4, 251-533. Nelson-Smith, 1967, Catalogue of marine fouling organisms Vol 3 Serpulids OECD Paris.
Boxshall, G. A. & Platts, E. A., 1978. The first record of the Copepod <i>Doridicola agilis</i> Leydig on the Nudibranch <i>Aeolidiella sanguinea</i> (Norman). <i>Ir. Nat. J.</i> , 19 , 252. Journal. 19: 252.	<i>Aeolidiella sanguinea</i>	none	Reference only - Locations not within ISP area. <i>Aeolidiella sanguinea</i> found in the following locations: May 1976 Murles Point, County Donegal, July 1976 St Johns Point, County Donegal and again from both location in March 1977, June 1977, July 1977. In March immature specimens found. May-July mature specimens found.



Reference	Species	Habitat	Comments
Brown, G. H., & Picton, B.E., 1976. <i>Trapania maculata</i> Haefelfinger, a new doridaean nudibranch new to the British Fauna. <i>J. Conch.</i> , 29 , 63-35.	<i>Trapania maculata</i>	none	Reference only - outside of ISP area. 1st record of <i>Trapania maculata</i> in UK :a rare Mediterranean dorid nudibranch recorded from Portland in May 1974.
Chester, C. M., 1996. The effect of adult nutrition on the reproduction and development of the estuarine nudibranch, <i>Tenellia adspersa</i> (Nordmann, 1845). <i>J. Expt. Mar. Biol. Ecol.</i> , 198 , 113-130.	<i>Tenellia adspersa</i> (<i>Tenella adspersa</i>)	none	Reference only - not within ISP area Collected from Squamscott River (New Hampshire) 70° 56' N 43° 02'W - Reproduction study not survey Reference: Roginskaya, 1970. <i>Malacol Rev.</i> 3 , 167-174.
Comely, C. A. & Ansell, A. D., 1988. Population density and growth of <i>Echinus esculentus</i> L. on the Scottish west coast. <i>Est. Coast. Shelf Sci.</i> , 27 , 311-334. : 311-334.	<i>Echinus esculentus</i>	none	Reference only - Scottish west coast, NE Mull, too far north References: Elmhirst, 1922. <i>Nature</i> , 110 , 667 - Clyde. Reid, 1935. <i>J. Animal Ecol.</i> , 4 , 7-16 Range of locations.
Comely, C. A. & Ansell, A. D., 1989. The reproductive cycle of <i>Echinus esculentus</i> L. on the Scottish west coast. <i>Est. Coast. Shelf Sci.</i> , 29 , 385-407. 07.	<i>Echinus esculentus</i>	none	Reference only - work on Scottish West coast (too far North) Duart & Cuan (locations in Comley & Ansell, 1988). References to Moore, 1935. <i>JMBA</i> , 20 , 109-128 (Isle of Man).
Elliot, J. M. & Corlett, J., 1972. The ecology of Morecambe Bay. IV. Invertebrate drift into and from the river Leven, <i>J. App. Ecol.</i> , 9 , 195-205.			Reference only - Has species list but not of required species.



Reference	Species	Habitat	Comments
Ellis, J. R. & Rogers, S. I., 2000. The distribution, relative abundance and diversity of echinoderms in the eastern English Channel, Bristol Channel, and Irish Sea, <i>J. Mar. Biol. Assoc. UK</i> , 80 , 127-138.	<i>Echinus esculentus</i>	none	Reference only
Ellis, J. R., Rogers, S. I. & Freeman, S. M., 2000. Demersal assemblages in the Irish Sea, St. George's Channel and Bristol Channel, <i>Est. Coast. Shelf Sci.</i> , 51 , 299-315.	<i>Echinus esculentus</i>	none	Reference only - references to other papers from Irish Sea area: Isle of Man, Cumbria, Liverpool Bay and Cardigan Bay. IOM : Jones, 1951. <i>J. Animal Ecol.</i> , 20 , 132-144; Jones, 1956. <i>J. Animal Ecol.</i> , 25 , 217-252. Bruce <i>et al.</i> , 1963 <i>Marine fauna of IOM</i> . Cumbria : Jones, 1952. <i>J. Animal Ecol.</i> , 21 , 185-205. Swift, 1993 <i>JMBA</i> , 73 , 143-162. Liverpool Bay : Eagle, 1973. <i>Est. Coastal Shelf Sci.</i> , 1 , 285-299, Rees & Walker (1991) 19th Symposium of Estuarine & Coastal Science (Olsen & Olsen) Cardigan Bay : Laurie & Watkin (1922) <i>Aberystwyth Studies</i> 4 229-250
Ellis, J., 2001. Sea-floor community disturbance. Lowestoft, Centre for Environmental Fisheries and Aquaculture Science (CEFAS): x,206.	<i>Modiolus modiolus</i> <i>Echinus esculentus</i>	<i>Modiolus modiolus</i> beds with <i>Chlamys varia</i> , sponges, hydroids and bryozoans on slightly tide-swept very sheltered circalittoral mixed substrata	Reference only - <i>MarLIN</i> have data in CEFAS beam trawl survey, previously provided to JNCC.
Forster, G. R., 1959. The ecology of <i>Echinus esculentus</i> L. Quantative distribution and rate of feeding, <i>J. Mar. Biol. Assoc. UK</i> , 38 , 361-367.	<i>Echinus esculentus</i>	none	Reference only - Plymouth sound populations not within ISP area. References: Elmhirst, 1922. Habitats of <i>E. esculentus</i> . <i>Nature</i> , 110 , 667 Reid, 1935. The range of the sea urchin <i>E. Esculentus</i> . <i>J Animal Ecol.</i> , 4 , 7-16.



Reference	Species	Habitat	Comments
Gilliland, P. M. & Sanderson, W. G., 2000. Re-evaluation of marine benthic species of nature conservation importance... <i>Aquat. Conserv.:Mar. Freshwat. Ecosyst.</i> , 1-12.	<i>Tenellia adspersa</i> (<i>Tenella adspersa</i>)	none	Reference only - paper not about included species but lists references for <i>Tenellia aspersa</i> . Picton and Morrow, 1994. <i>A field guide to nudibranchs</i> Seaward, 1991. <i>Red data book part 3</i> Wilson & Wilson, 1999. <i>J. Conchology</i> , 35(2) , 125. (Essex) 7 known records of <i>T. aspersa</i> in 20th century BUT may be because they are small and easily overlooked. Found in estuaries, creeks, saltmarsh pools and lagoons.
Grudemo, J. & Andre, C., 2001. Salinity dependence in the marine mud snails <i>Hydrobia ulvae</i> and <i>Hydrobia ventrosa</i> , <i>J. Mar. Biol. Assoc. UK</i> , 81 , 651-654.	<i>Hydrobia</i> (<i>Ventrosia ventrosa</i>)	none	Reference only - no relevant distributional information included. References: Grudemo & Bohlin, 2000. <i>J. Exp. Mar. Biol. Ecol.</i> , 253 , 115-127. Grudemo & Johannesson, 1999. <i>J. Exp.Mar. Biol. Ecol.</i> , 239 , 167-181.
Grudemo, J. & Johannesson, K., 1999. Size of mudsnails, <i>Hydrobia ulvae</i> (Pennant) and <i>H. ventrosa</i> (Montagu), in allopatry and sympatry. <i>J. Expt. Mar. Biol. Ecol.</i> , 239	<i>Hydrobia</i> (<i>Ventrosia ventrosa</i>)		Reference only - <i>Hydrobia ventrosa</i> found in Sweden. Reference: Siegismund, 1982. <i>Mar. Ecol. Prog. Ser.</i> , 7 , 75-82.
Harris, T., 1991. Some aspects of the specific habitat requirements of <i>Ophelia bicornis</i> (Polychaeta), <i>J. Mar. Biol. Assoc. UK</i> , 71 , 771-786.	<i>Ophelia bicornis</i>	none	Reference only - <i>Ophelia bicornis</i> , River Exe, Devon Lists habitat requirements for <i>Opheila bicornis</i> .
Harris, T., 1991. The occurrence of <i>Ophelia bicornis</i> (Polychaeta) in and near the estuary of the River Exe, Devon, <i>J. Mar. Biol. Assoc. UK</i> , 71 , 391-402.	<i>Ophelia bicornis</i>	none	Reference only Exe estuary. Site most northerly for species and only within UK. Distribution described.
JNCC, 1991. <i>British Red Data Books: 3. Invertebrates other than insects</i> . Peterborough: JNCC, pp 51-52.	<i>Tenellia adspersa</i> (<i>Tenella adspersa</i>)	none	Reference only - no survey data included <i>Tenellia adsepersa</i> , British records from: Aberlady Bay - East Lothian, Firth of Forth, Northumberland, north Norfolk, southeast and south coasts, Bristol Channel and Liverpool Bay. Ref: Thompson & Brown, 1984. <i>Biology of opisthobranch molluscs</i> . London, Ray Society.



Reference	Species	Habitat	Comments
Mair, J. M., <i>et al.</i> , 2000. A review of the status, ecology and conservation of horse mussel beds in Scotland. SNH report F99PA08.	<i>Modiolus modiolus</i>		Reference only - actual survey too far north Geographical distribution mentioned in the text with associated references.
Manuel, R. L., 1981. On the identity of the sea anemone <i>Scolanthis callimorphus</i> Gosse, 1853 (Actiniaria: Edwardsiidae). <i>J. Nat. His.</i> , 15(2) , 265-276.	<i>Scolanthis callimorphus</i>	none	Reference only - Locations of <i>Scolanthis callimorphus</i> . Limited distribution Weymouth, Naples, Brittany, Roskeeda Bay - County Galway. Unlikely to occur in ISP area?
Minchin, D., 1987. <i>Serpula vermicularis</i> L. (Polychaeta: Serpulidae) reef communities from the west coast of Ireland, <i>Ir. Nat. J.</i> , 22(7) , 314-316.	<i>Serpula vermicularis</i>	none	Reference only - west coast of Ireland so not within ISP area.
Moore, C. G., Saunders, G. R. & Harries, D. B., 1998. The status and ecology of reefs of <i>Serpula vermicularis</i> L. (Polychaeta: Serpulidae) in Scotland, <i>Aquat. Conserv.: Mar. Freshwat. Ecosyst.</i> , 8 , 645-656.	<i>Serpula vermicularis</i>		Reference only - <i>Serpula vermicularis</i> found in Loch Creran (too far north). Loch Creran only known location of <i>S. vermicularis</i> reefs in Scotland. Reference: Bosence, 1973. 'Recent Serpulid reefs' Connemara Eire. <i>Nature</i> , 242 , 40-42; Connor, 1990. Survey of Loch Linnhe etc NCC Mitchin, 1987. <i>Ir Nat J.</i> , 22 , 314-316.
Rae, B. B., Lamont, J. M., 1963. Rare marine invertebrates found in the Scottish area. <i>Scot.Nat.</i> , 71 , 23-28	<i>Palinurus elephas</i>	none	Reference only - locations not within the ISP area. Recordings of <i>Palinurus vulgaris</i> (synonym of <i>Palinurus elephas</i>) are made from locations off the far north east coast of Scotland, Shetland Isles, and the far north west coast of Scotland.



Reference	Species	Habitat	Comments
Nichols, D., 1979. A nationwide survey of the British sea-urchin, <i>Echinus esculentus</i> . <i>Progr Underw. Sci</i> , 4 , 161-187.	<i>Echinus esculentus</i>	none	Reference only - survey carried out in Isle of Skye, NW Scotland, Bantry Bay, SW Ireland, Lamorna Cove, Cornwall, SW England. No sites withing ISP area.
Ryland, J. S., 2000. Reproduction in British zoanthsids, and an unusual process in <i>Parazoanthus anguicomus</i> . <i>J. Mar. Biol. Assoc. UK</i> , 80(3) , 943-944.	<i>Parazoanthus axinellae</i>	none	Reference only - no distribution information. Reference to: Manuel, 1988. <i>Linnean Synopsis Anthozoa</i> .
Segar, D. A., Collins, J. O. & Riley, J. P., 1971. The distribution of the major and some minor elements in marine animals. Part 2. Molluscs. <i>J. Mar. Biol. Assoc. UK</i> , 51(1) , 131-136.	<i>Modiolus modiolus</i>	none	Reference only - no exact locations given <i>M. modiolus</i> collected from Irish sea in vicinity of Port Erin .
Tebble, N, 1976. <i>British Bivalve Seashells</i> . Edinburgh: Her Majesty's Stationary Office.	<i>Acanthocardia aculeata</i>	none	Reference only <i>Acanthocardia aculeata</i> not common in British Waters, occurring only in the south-west. Distributed south to Iberian Peninsula into the Mediterranean and along the Atlantic coast to Morocco.
Turon, X., 1992. Periods of non-feeding in <i>Polysyncraton lacazei</i> (Asciacea: Didemnidae): a rejuvenative process? <i>Mar. Biol.</i> , 112 , 647-655.	<i>Polysyncraton lacazei</i>	none	Reference only <i>Polysyncraton lacazei</i> found in north-west Mediterranean, no descption of other locations given. Is species found within ISP area?
Wahl, M. & Lafargue, F., 1990. Marine epibiosis. II. Reduced fouling on <i>Polysyncraton lacazei</i> (Didemnidae, Tunicata) and proposal of an antifouling potential index. <i>Oecologia</i> ,	<i>Polysyncraton lacazei</i>	none	Reference only <i>Polysyncraton lacazei</i> - collected from north-west Mediterranean no discussion of other locations, does it occur elsewhere?



Reference	Species	Habitat	Comments
82, 275-282.			
Wilson, J. B., 1976. Attachment of the coral <i>Caryophyllia smithii</i> S, J. Mar. Biol. Assoc. UK, 56, 291-303.	<i>Caryophyllia smithii</i>	none	Reference only - specimens collected from continental shelf to north and west of Scotland, too far north References: Gosse, 1860. <i>Actinologia Britannica</i> - A list of British anemones and corals Wilson, 1975. The distribution of the coral <i>C. smithii</i> on the Scottish continental shelf. <i>JMBA</i> , 55, 611-625.

**Results by Stage 2 species**

All species on the list were searched by sea area and by species name, leads found in the previous stage were followed up. Records within the Irish Sea Pilot area were not found on all species.

TABLE 2

Latin Name	Sources identified
<i>Amphianthus dohrnii</i>	No sources identified within the Irish Sea pilot area. Manuel (1988) describes it as "Formerly common in the English channel and around southern Ireland...appears to have become rare..."
<i>Leptopsammia pruvoti</i>	No records within Irish Sea Pilot area found (record from Lundy from Dr Bill Sanderson).
<i>Scolanthus callimorphus</i>	No sources found for distribution of species within Irish Sea Pilot area. Manuel (1981) comments on the limited distribution of the species in Weymouth, Naples, Brittany, Roskeeda Bay - County Galway.
<i>Alcyonium glomeratum</i>	Records found within Irish Sea Pilot area are from Skomer Island, Pembrokeshire (Dr Bill Sanderson).
<i>Caryophyllia inornata</i>	Records found within Irish Sea Pilot area are from Skomer, Pembrokeshire (Dr Bill Sanderson).
<i>Caryophyllia smithii</i>	Records from Isle of Man (Bruce <i>et al.</i> , 1963; Moore, 1937), Skomer (Rostron, 1988; Dr Bill Sanderson) and Strangford Lough (Williams, 1954).
<i>Hoplangia durotrix</i>	Only one record from within Irish Sea Pilot area; Skomer (Dr Bill Sanderson).
<i>Parazoanthus axinellae</i>	Records from Skomer, Pembrokeshire (Dr Bill Sanderson).
<i>Ophelia bicornis</i>	Found in the Exe Estuary, this site is the most northerly for the species and only within UK (Harris, 1991).
<i>Sabellaria spinulosa</i>	Records from Isle of Man (Bruce <i>et al.</i> , 1963; Moore, 1937) and Skomer (Rostron, 1988).
<i>Sternaspis scutata</i>	No records within Irish Sea Pilot area all records from Portland (Dr Bill Sanderson).
<i>Achaeus cranchii</i>	Isle of Man (Bruce, 1963).
<i>Pectenogammarus planicrurus</i>	Aberystwyth, west Wales (Bell & Fish, 1996; Morgan, 1970) Isle of Man (Bruce, 1963; Jones, 1948) County Dublin (Duhig, 1960; Duhig & Humphries, 1955 – entered as metadata only).
<i>Acanthocardia aculeata</i>	No sources within Irish Sea Pilot area found. Tebble (1976) describes it as "...not common in British Waters, occurring only in the south-west."
<i>Aeolidiella sanguinea</i>	Record from Isle of Man (Dr Bill Sanderson)
<i>Atrina fragilis</i>	Firth of Clyde (Allen, 1962), non-confirmed record from Clyde Basin (Woodward, 1985 – entered as metadata only).



Latin Name	Sources identified
<i>Caloria elegans</i>	Record from Cardigan Bay (Dr Bill Sanderson)
<i>Doris sticta</i>	Referred to Picton & Morrow (1994) for distribution by Dr Bill Sanderson – found around Skomer – no actual records of surveys found in literature.
<i>Hydrobia (Ventrosia) ventrosa</i>	Record from one location: Anglesey (Barnes, 1987).
<i>Nucella lapillus</i>	Records from 19 locations within Irish Sea Pilot area. Anglesey (Spence <i>et al.</i> , 1987; Seaward, 1993, 1990, 1982), Antrim (Seaward, 1993, 1990, 1982), Arran (Smith, 1984), Belfast (Seaward, 1993, 1990, 1982), Bristol Channel (Seaward, 1993, 1990, 1982), Cardigan Bay (Seaward, 1993, 1990, 1982; Spence <i>et al.</i> , 1987, 1990; Hayter, 1988) Clyde & Argyll (Seaward, 1993, 1990, 1982), Cumbria (Hayter, 1988; Spence <i>et al.</i> , 1987) Dublin (Seaward, 1993, 1990, 1982), Isle of Cumbrae (Spence <i>et al.</i> , 1987), Isle of Man (Seaward, 1993, 1990, 1982; Bruce, 1963; Moore, 1937), Lancashire, (Spence <i>et al.</i> , 1990, 1987) Liverpool Bay, (Seaward, 1993, 1990, 1982), Loch Fyne (Davies, 1989) Menai Straits (Spence <i>et al.</i> , 1987; Lumb, 1983), Nymphe Bay (Seaward, 1993, 1990, 1982), Pembrokeshire (Crothers, 1974; Spence <i>et al.</i> , 1990, 1987; Hayter, 1988) North Ayrshire (Spence <i>et al.</i> , 1987), Solway (Seaward, 1993, 1990, 1982), South Ayrshire (Spence <i>et al.</i> , 1990, 1987)
<i>Okenia elegans</i>	Records from Antrim (Seaward, 1993, 1990, 1982), Bristol Channel (Seaward, 1993, 1990, 1982), Skomer and St Brides Bay, Pembrokeshire (Dr Bill Sanderson).
<i>Patella ulyssiponensis aspera</i>	Records from 11 locations within Irish Sea Pilot area. Anglesey (Seaward, 1993, 1990, 1982), Antrim (Seaward, 1993, 1990, 1982), Belfast (Seaward, 1993, 1990, 1982), Bristol Channel (Seaward, 1993, 1990, 1982), Cardigan Bay (Seaward, 1993, 1990, 1982), Clyde (Seaward, 1993, 1990, 1982; Allen, 1962), Dublin (Seaward, 1993, 1990, 1982), Isle of Man (Seaward, 1993, 1990, 1982; Bruce <i>et al.</i> , 1963), Menai Bridge (Oliver <i>et al.</i> , 1986), Nymphe Bay (Seaward, 1993, 1990, 1982), Solway (Seaward, 1993, 1990, 1982)



Latin Name	Sources identified
<i>Tenellia adspersa</i> (<i>Tenella adspersa</i>)	Records from Bristol channel (Seaward, 1993, 1990, 1982), Liverpool Bay (Seaward 1993, 1990, 1982).
<i>Trapania maculata</i>	A rare Mediterranean dorid nudibranch. 1 st recorded in UK from Portland in May 1974. 1 location within Irish Sea Pilot area: Cardigan Bay (Seaward, 1990).
<i>Echinus esculentus</i>	Isle of Man (Bruce <i>et al.</i> , 1963), Skomer (Bishop, 1989; Bishop & Earll, 1984), Firth of Clyde (Comley & Ansell, 1988), Loch Fyne (Davies, 1989)

Results by Stage 2 habitats

The decision was made to search for information on the distribution of species which occur within a habitat (biotope) as well as to search for information on the biotope itself. No relevant surveys were found which included biotope mapping/recording. The majority of survey results published in the literature do not include raw data needed to confidently identify a biotope. Therefore, the biotope table within Marine Recorder has not been filled in as it was concluded that biotopes could not be inferred from the sources identified.

TABLE 3:

Habitat Name	Sources identified
<i>Pectenogammarus planicrurus</i> in midshore well-sorted gravel or coarse sand	Aberystwyth, west Wales (Bell & Fish, 1996; Morgan, 1970)
Cirratulids and <i>Cerastoderma edule</i> in littoral mixed sediment	No sources identified.
<i>Sabellaria alveolata</i> reefs on sand-abraded eulittoral rock	Wicklow Head (Grave & Whitaker, 1997)
<i>Flustra foliacea</i> and <i>Haliclona oculata</i> with a rich faunal turf on tide-swept circalittoral mixed substrata	No sources identified.
<i>Suberites</i> sp. with a mixed turf of crisiids and <i>Bugula</i> sp. on heavily silted, moderately wave exposed, shallow circalittoral rock	No sources identified.
<i>Ampharete falcata</i> turf with <i>Parvicardeum ovaleum</i> cohesive muddy very fine sand near margins of deep stratified seas	No sources identified.
<i>Styela gelatinosa</i> and other solitary ascidians on very sheltered deep circalittoral muddy sediment	No sources identified.
<i>Modiolus modiolus</i> beds with <i>Chlamys varia</i> , sponges, hydroids and bryozoans on slightly tide-swept very sheltered circalittoral mixed substrata	Strangford Lough (Erwin, 1977)
<i>Modiolus modiolus</i> beds on circalittoral mixed sediment	Isle of Man (Jones, 1951)
<i>Limaria hians</i> beds in tide-swept sublittoral muddy mixed sediment	Firth of Clyde (Hall-Spencer & Moore, 2000)



Products

The contract was awarded against the deliverables detailed at the start of the report. In accordance with the contract we enclose:

- A copy of Marine Recorder data covering 49 data sets (including Stage 1 datasets) detailing locational data for the 35 species and 13 habitats.
- List of data sources covered – as provided in Tables 1a-c, 2 and 3
- List of searches made – this report details the searches made. A list of references cited has been included at the end of the report all surveys that have been entered into Marine Recorder have a reference included.

Next stage

JNCC will produce maps from the existing data that they hold and the data gathered during stages 1 and 2 of the project. The maps and metadata will be released to a list of organizations and individuals, as specified in Annex D of tender specification, for consultation by 20th May 2003. We expect the consultation to include a JNCC generated map and MBA generated table of references for each of the species and habitats. The respondents detailed in the tender documentation will be asked to indicate their acceptance of the data gathered and whether they are aware of additional data sources. We would like to discuss with JNCC following up any leads from the consultation as well as any leads generated by this exercise.

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